Year 2000 Test Report for the Airport Movement Area Safety System (AMASS)

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February 2000

DOT/FAA/CT-TN99/3

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20000314 025

NOTICE

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1. Report No. DOT/FAA/CT-TN99/3	2. Government Accession No.	3. Recipient's Catalog No.	
4. Title and Subtitle Year 2000 Test Report for the Airport Movement Area Safety System (AMASS)		5. Report Date February 2000	
		6. Performing Organization Code ACT-310	
		8. Performing Organization Report No. DOT/FAA/CT-TN99/3	
7. Author(s) Jeffrey Livings			
9. Performing Organization Name and Address U.S. Department of Transportation Federal Aviation Administration William J. Hughes Technical Center Atlantic City International Airport, NJ 08405		10. Work Unit No. (TRAIS)	
		11. Contract or Grant No.	
12. Sponsoring Agency Name and Address U.S. Department of Transportation Federal Aviation Administration William J. Hughes Technical Center Atlantic City International Airport, NJ 08405		13. Type of Report and Period Covered Technical Note	
		14. Sponsoring Agency Code	

15. Supplementary Notes

16. Abstract

This test report documents the tests performed on the Airport Movement Area Safety System (AMASS) to ensure that the system is Year 2000 compliant.
The AMASS is an enhancement to the Airport Surface Detection Equipment (ASDE-3). AMASS receives digitized radar data, synchronization data, and a time/date stamp from the ASDE. AMASS does not process the ASDE data/time information but only logs the event. AMASS does not transmit time or date information to the ASDE or any other system.

AMASS also receives digitized beacon radar data through its Terminal Automation Interface Unit (TAIU). The TAIU receives data from the Airport Surveillance Radar (ASR-9). There is no date information transferred to or from the AMASS TAIU interface.

The AMASS system has met all of the Year 2000 compliance criteria. Additional checks have been added to the AMASS acceptance data package (ADP) which will insure that the built-in operating system (BIOS) of each production AMASS will be compliant. The Surveillance Branch, ACT-310, recommends certifying the AMASS as Year 2000 compliant.

17. Key Words Airport Movement Area Safety System (AMASS) Year 2000		18. Distribution Statement Document is on file at the William J. Hughes Technical Center Library, Atlantic City International Airport, NJ 08405	
19. Security Classif. (of this report) Unclassified	20. Security Classif. (of this page) Unclassified	21. No. of Pages 22	22. Price

Form DOT F 1700.7 (8-72)

EXECUTIVE SUMMARY

The Airport Movement Area Safety System (AMASS) system has met
all of the Year 2000 compliance criteria. Additional checks have
been added to the AMASS acceptance data package (ADP) which will
insure that the built-in operating system (BIOS) of each
production AMASS will be compliant. The Surveillance Branch,
ACT-310, recommends certifying the AMASS as Year 2000 compliant.

1. INTRODUCTION.

1.1   PURPOSE.

The purpose of this report is to provide the test results of the
Year 2000 tests conducted on the Airport Movement Area Safety
System (AMASS).

1.2   BACKGROUND.

The AMASS is an enhancement to the Airport Surface Detection
Equipment (ASDE-3). AMASS receives digitized radar data,
synchronization data, and a time/date stamp from the ASDE. AMASS
does not process the ASDE data/time information but only logs the
event. AMASS does not transmit time or date information to the
ASDE or any other system.

AMASS also receives digitized beacon radar data through its
Terminal Automation Interface Unit (TAIU). The TAIU receives data
from the Airport Surveillance Radar (ASR-9). There is no date
information transferred "to" or "from" the AMASS TAIU interface.

2. TEST DESCRIPTION.

The AMASS Year 2000 tests consist of three tests developed from
the Year 2000 compliance criteria checklist (see appendix A). The
As Run Test Procedures are contained in appendix B.

Test 1 is a general integrity test and insures that the AMASS
system operates correctly through the date rollover of the
required Year 2000 dates. This includes the processing and
listing of log files.

Test 2 insures that the system will operate correctly if it had
been powered down during the date rollover of the required Year
2000 dates.

Test 3 insures that dates entered into the system will be
correctly interpreted.

3. TEST RESULTS.

The Y2K test were first performed on Build 8 of the AMASS on
January 5, 1999.

Initial Test 1 failed because the AMASS application incorrectly
processed log files following leap Year rollovers. Also, the

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ability to print the ASDE date event could not be tested, as the ASDE date event was not being logged.

Initial Test 2 failed when the rollover from December 31, 1999, resulted in an incorrect system date of January 4, 1980.

Initial Test 3 passed. It was noted that the system disk operating system (DOS) would not accept a two-digit input but required the year to input in a four-digit format. The built-in operating system (BIOS) date input requires the user to select from a four-digit year only.

The system had an interim regression test performed on a test build that included an updated system BIOS on January 7, 1999. The test showed that the test failures had been resolved. However, the system was still not logging the ASDE date event.

Final tests were run on the AMASS baseline software Build 13 on January 27, 1999.

The system completely passed all of three of the Year 2000 tests. The data sheets from the final test conduct are included in appendix C.

4. CONCLUSIONS.

The Airport Movement Area Safety System (AMASS) has met all of the Year 2000 compliance criteria. Additional checks have been added to the AMASS acceptance data package (ADP) which will insure that the built-in operating system (BIOS) of each production AMASS will be compliant.

5. RECOMMENDATIONS.

The Surveillance Branch, ACT-310, recommends certifying the AMASS as Year 2000 compliant.

6. ACRONYMS.

ADP   Acceptance Data Package

AMASS   Airport Movement Area Safety System

ASR   Airport Surveillance Radar

BIOS   Built-in Operation System

DOS   Disk Operating System

APPENDIX A
Y2K COMPLIANCE CRITERIA CHECKLIST

Y2K Compliance Criteria Checklist		
	Criteria/Description	Notes/Results
1	GENERAL INTEGRITY – No value for entered for the current date will cause interruption in normal operations.	General requirement. Passes if all requirements listed in section 1 pass. *Pass*
1.1	All software on all platforms shall produce no errors in values or operations, regarding date processing, for all system dates between 1985-01-01 and the end of the system's projected life cycle of 2020-01-01	*Pass*
1.2	All equipment and software, while in the powered-up condition, shall roll over to the next correct date for the following dates: 1998-12-31, 1999-09-09, 1999-12-31, 2000-01-01, 2000-02-28, 2000-02-29, 2000-03-01, 2000-12-31, 2001-01-01, 2027-12-31, 1999-09-30.	Correct dates must be displayed in (1) playback, (2) log utility, (3) OS2 date display, (4) and logging through midnight overlap. *Pass*
1.3	All equipment and software while in powered-down condition shall roll over to the next correct date for the following dates: 1998-12-31, 1999-09-09, 1999-12-31, 2000-01-01, 2000-02-28, 2000-02-29, 2000-03-01, 2000-12-31, 2001-01-01, 2027-12-31, 1999-09-30.	No playback, power-on and check date. *PASS*
1.4	All software and firmware shall be tested to ensure that when the system rolls over to the year 2000, licensing date functions properly process the rollover date.	Not applicable
1.5	GPS receivers shall be able to perform the following rollover 1999-08-21 to 1999-08-22	Not applicable

	Y2K Compliance Criteria Checklist	
	Criteria/Description	Notes/Results
2	Data Integrity – All manipulations of calendar-related data (dates, duration, days of week, etc) will produce desired results for all valid date values within the application domain.	General requirement. Passes if all requirements listed in _Pass_ section 2 pass.
2.1	All systems or applications that use Gregorian dates shall be able to process or display the correct date (year, month, day) when called upon by a system application date function based on the Gregorian calendar as follows: 1. 31 days for Jan, Mar, May, July, Aug, Oct, and Dec. 2. 30 days for April, June, Sept, and Nov. 3. 28 days for Feb (non-leap year), 29 days for Feb (leap year)	Pass/Fail (See 1.2)
2.2	All systems or applications that use Julian dates shall be able to process or display the correct date (year, day of year) when called upon by a system or application date function	Not applicable
2.3	The system or application shall be able to correctly compute the duration between any two dates of 1900-01-01 and the end of the projected life cycle.	Create log and delete logs after 15 days. Pass/Fail
2.4	The system or application shall be able to correctly compute the day of the week, the day within the year and the week within the year for any dates between the dates of 1900-01-01 and the end of the projected life cycle.	Not applicable
2.5	The system or application shall be able to correctly compute the date based on a starting date and a duration.	Not applicable
2.6	The system or application shall be able to correctly compare two dates a follows and determine one of the following: 1. Dates are the same 2. One date is older than the other or 3. One date is newer than the other	Pass/Fail
2.7	The system or application shall be able to correctly convert between the year-month-day format and the Julian date format for leap years and non-leap years	Pass/Fail
2.8	The system or application shall be able to correctly store or retrieve data between the dates of 1900-01-01 and the end of its projected life cycle.	Pass/Fail (See 1.2)
2.9	The system or application shall be able to correctly sort and merge data between the dates of 1900-01-01 and end its projected life cycle.	Not applicable
2.10	The system or application shall be able to correctly search for data between the dates of 1900-01-01 and the projected life cycle.	Pass/Fail
2.11	The system or application shall return the correct date value for all unique date functions (Julian, offset, windowing)	Pass/Fail (See 1.2)
2.12	The system or application shall correctly process dates for both leap yar and non-leap year dates.	Pass/Fail (See 1.2)
2.13	When processing Julian dates, the system or application shall process the Julian date 99365 correctly	Not applicable

Y2K Compliance Criteria Checklist		
	Criteria/Description	Notes/Results
3	Explicit Century – Date elements in interfaces and data storage permit specifying century to eliminate date ambiguity.	General requirement. Passes if all requirements listed in section 3 pass. *Pass JL*
3.1	4. The system or application shall use a four-digit year when storing dates.	Pass/Fail (See 1.2) JL
3.2	The system or application shall use a four-digit year for all human-machine interface date data entries.	Pass/Fail JL
3.3	The system or application shall use a four-digit year when transmitting data over an interface.	Pass/Fail JL
3.4	The system or application shall only accept and correctly process a four-digit year when receiving date data over an interface. ·	Pass/Fail JL
3.5	All systems or applications shall correctly display four-digit years.	Pass/Fail JL
3.6	The system or application shall produce no errors in value or operation when a four-digit year date is inputted into the system through either an external interface or a keyboard entry.	Pass/Fail (See 1.2) JL

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	Y2K Compliance Criteria Checklist		
	Criteria/Description	Notes/Results	
4	Implicit Century – For any date represented without century, the correct century is unambiguous for all manipulations involving that element	General requirement. Passes if all requirements listed in section 4 pass. *Pass* JL	
4.1	The system or application determine the proper century date when retrieving date data that stored with less than four-digits in its year.	Pass/Fail JL	
4.2	The system or application shall determine the proper century date with 100% accuracy for any dates received over an interface that has less than four-digits in its year.	Not Applicable	
4.3	The system or application shall determine the proper century date for any date data entered via a human-machine interface with less than four digits in its year.	Pass/Fail JL	
4.4	The system or application shall produce no errors in year value when a year with less than four-digits is inputted into the system through an external interface or a keyboard entry.	Pass/Fail JL	

APPENDIX B
AS RUN TEST PROCEDURES

Y2K COMPLIANCE TESTS

TEST 1 – GENERAL INTEGRITY

Compliance Criteria 1.1, 1.2, 2.1, 2.3, 2.6, 2.8, 2.10, 2.11, 2.12, 3.1, 3.2, 3.4

REQUIREMENT: No value for current date will cause interruptions in normal operations

TEST PROCEDURES

1. Ensure the ASDE (or ASDE simulator) is running.
2. Remove all current AMASS log files.
3. From DOS set the system date to that listed in Column 1 (from Y2K Table 1).
4. Set the system time to 23:58:00 (11:58 PM).
5. Start the AMASS application and select Workstation-Sensor mode.
6. After initialization, set system logging as per column 2. And go on-line.
7. Verify that the date transitions to the value in column 3, circle Pass or Fail.
8. Verify that AMASS continues to process targets correctly, circle Pass or Fail in column 4.
9. Allow the system to run for at least another 5 minutes.
10. Go off-line and select Workstation Disk Mode.
11. List the logs currently stored by the AMASS.
12. Verify that files with dates equal to or earlier than column 5 have been deleted, circle Pass or Fail.
13. Open and playback the log listed in column 6.
14. Verify that AMASS processes targets correctly, circle Pass or Fail in column 6.
15. Stop Playback and shut down the AMASS application.
16. Start the AMASS Log Analysis Program.
17. Open the log listed in column 6.
18. Print out the ASDE time events. _AMASS_
19. Ensure that the ASDE dates are correct and listed in 4 digit format, circle Pass or Fail in column 7.
20. Repeat starting from step 3 with the next row until all rows of Y2K Table 1 have been completed.

SUCCESS CRITERIA

1. The system operates as expected when processing the operating system's current date.
2. The system operates as expected when the current date rolls over from 1999 to 2000.
3. The system operates as expected when processing dates from two different centuries during the same step.
4. The system operates as expected when retrieving information from a previous century.
5. The system maintains the integrity of the data when it processes dates.
6. The system displays clear and understandable dates on its outputs and displays.
7. The system provides dates in a form that can be read by other systems.
8. The system operates as expected when processing known interfaces that contain date values or character representations of date values.

TEST 2 CHECK SYSTEM FOR DATES & TIMES WHILE SYSTEM IS POWERED DOWN.

Compliance Criteria - 1.3

REQUIREMENT: All equipment and software while in the powered down condition shall roll over to the next correct date. When the system is powered down on any of the Y2K Table 2 Start dates and powered up on the next day, the dates and times shall have advanced correctly.

TEST PROCEDURE:

Power system down using Y2K TABLE 1 Start dates and times are set to 23:58. Power system up after 5 minutes and verify Y2K TABLE 1 Expected rollover DATES and times .are correct

1. From DOS enter the Power Down Date to that listed in column 1 of Y2K TABLE 2.
2. From DOS set the system time to 23:58:00 (11:58 PM).
3. Record the current time. Power down the AMASS by toggling the POWER switch located on the cabinet front top panel to OFF.
4. Turn off the CYBEX Assembly power.
5. Wait 5 minutes, toggle AMASS power switch to ON
6. Turn CYBEX Assembly power to ON
7. Verify the time advanced 5 minutes.
8. Verify the day advanced to the next calendar day
9. Repeat steps 1 through 8 for all the START dates in Y2K TABLE 1.

TEST 3 DATE INTEGRITY

Compliance Criteria 3.2, 3.5, 3.6

REQUIREMENT: The system will process implicit dates and explicit dates correctly.

CRITERIA: The system or application shall use a four-digit year for all human/machine interface date/data entries.

Test Procedure - The eleven critical dates from Y2K TABLE 1 will be entered in explicit and implicit date format in: DOS, BIOS, and OS/2.

1. At the PC open a DOS window.
2. Type DATE and set the system date using the explicit date listed in Column 1 (from Y2K Table 3).
3. Verify the system date is correct, circle P for pass or F for Fail.
4. Return to step 2 and continue entering the DOS Explicit Dates until they have all been tested.
5. Type DATE and set the system date using the implicit date listed in Column 2.
6. Verify the system date is correct, circle P for pass or F for Fail.
7. Return to step 5 and continue entering the DOS Implicit Dates until they have all been tested.
8. At the PC open an OS/2 Window
9. Type DATE and set the system date using the explicit date listed in Column 3.
10. Verify the system date is correct, circle P for pass or F for Fail.
11. Return to step 9 and continue entering the OS2 Explicit Dates until they have all been tested.
12. Type DATE and set the system date using the implicit date listed in Column 4.
13. Verify the system date is correct, circle P for pass or F for Fail.
14. Return to step 12 and continue entering the OS2 Implicit Dates until they have all been tested.
15. Power down the PC and then power-up.
16. At setup, enter F2 and move mouse to BIOS date.
17. Set the system date using the BIOS Explicit Dates listed in Column 2 and exit.
18. Verify the system date is correct, circle P for pass or F for Fail.
19. Return to step 15 and continue entering the BIOS Explicit Dates until they have all been tested.
20. Power down the PC and then power-up.
21. At setup, enter F2 and move mouse to BIOS date.
22. Set the system date using the BIOS Implicit Dates listed in Column 2 and exit.
23. Verify the system date is correct, circle P for pass or F for Fail.
24. Return to step 15 and continue entering the BIOS Implicit Dates until they have all been tested.

APPENDIX C
DATA SHEETS

Y2K TABLE 1

1 INITIAL DATE	2 COLLECT LOG	3 ROLLOVER DATE 1.2, 2.12	4 SYSTEM PROCESS 2.1, 1.1	5 LOG DEL DATE 2.3, 2.6, 2.8	6 PLAYBACK DATE 2.1, 2.8, 3.1, 3.2, 3.5	7 PRINT DATE 2.8, 2.11, 3.1, 3.2, 3.4
1.-1998-12-31	YES	D.1/1/1999 (P)/F	(P)/F			(P)/F
D.1999-01-01	YES	D.1/2/1999 (P)/F	(P)/F			(P)/F
D.1999-01-15	NO				D.12/31/1999 (P)/F	
D.1999-01-16	NO			D.12/31/1998 (P)/F	D.1/1/1999 (P)/F	
D.1999-01-17	NO			D.1/1/1999 (P)/F		
2.-1999-09-09	YES	D. 9/10/1999 (P)/F	(P)/F			(P)/F
D.1999-09-24	NO				D.9/9/1999 (P)/F	
D.1999-09-25	NO			D.9/9/1999 (P)/F	D.9/10/1999 (P)/F	
3.-1999-12-31	YES	D.1/1/2000 (P)/F	(P)/F			
4. 2000-01-01	YES	D.1/2/2000 (P)/F	(P)/F			
D.2000-01-15	NO				D.12/31/1999 (P)/F	
D.2000-01-16	NO			D.12/31/1999 (P)/F	D.1/1/2000 (P)/F	
D.2000-01-17	NO			D.1/1/2000 (P)/F		
5. 2000-02-28	YES	D.2/29/2000 (P)/F	(P)/F			
6. 2000-02-29	YES	D.3/1/2000 (P)/F	(P)/F			
7. 2000-03-01	YES	D.3/2/2000 (P)/F	(P)/F			
D.2000-03-14	NO				D.2/28/2000 (P)/F	
D.2000-03-15	NO			D.2/28/2000 (P)/F	D.2/29/2000 (P)/F	
D.2000-03-16	NO			D.2/29/2000 (P)/F	D.3/1/2000 (P)/F	
8. 2000-12-31	YES	D.1/1/2001 (P)/F	(P)/F			
9. 2001-01-01	YES	D.1/2/2001 (P)/F	(P)/F			
D.2001-01-15	NO				D.12/31/2000 (P)/F	
D.2001-01-16	NO			D.12/31/2000 (P)/F	D.1/1/2001 (P)/F	
D.2001-01-17	NO			D.1/1/2001 (P)/F		
10. 2027-12-31	YES	D.1/1/2028 (P)/F	(P)/F			
D.2028-01-01	YES	D.1/2/2028 (P)/F	(P)/F			
D.2028-01-15	NO				D.12/31/2027 (P)/F	
D.2028-01-16	NO			D.12/31/2027 (P)/F	D.1/1/2028 (P)/F	
11.1999-09-30	YES	D.10/1/1999 (P)/F	(P)/F			
D. 1999-10-01	YES	D. 10/2/1999 (P)/F	(P)/F			
D. 1999-10-15	NO				D.9/30/1999 (P)/F	
D. 1999-10-16	NO			D.9/30/1999 (P)/F	D.10/1/1999 (P)/F	

D.2001-02-28	YES	D.3/1/2001 (P)F	(P)F	D.2/28/2001 (P)F
D.2001-03-15	NO			D.3/01/2001 (P)F
D.2001-03-16	NO		D.2/28/2001 (P)F	
D.2004-02-28	YES	D.2/29/2004 (P)F	(P)F	D.2/28/2004 (P)F
D.2004-02-29	YES	D.3/1/2004 (P)F	(P)F	D.2/29/2004 (P)F
D.2004-03-15	NO		D.2/28/2004 (P)F	
D.2004-03-16	NO		D.3/01/2004 P/F 2/29/2004 (P)F	3/01/2004 (P)F

Y2K TABLE 2

1	2	4
POWER DOWN DATE	POWER UP DATE	DATA PROCESSING
		1.3
1. 1998-12-31	1. 1999-01-01	P/F
2. 1999-09-09	2. 1999-09-10	P/F
3. 1999-12-31	3. 2000-01-01	P/F
4. 2000-01-01	4. 2000-01-02	P/F
5. 2000-02-28	5. 2000-02-29	P/F
6. 2000-02-29	6. 2000-03-01	P/F
7. 2000-03-01	7. 2000-03-02	P/F
8. 2000-12-31	8. 2001-01-01	P/F
9. 2001-01-01	9. 2001-01-02	P/F
10. 2027-12-31	10. 2028-01-01	P/F
11. 1999-09-30	11. 1999-10-01	P/F

Y2K TABLE 3

	1	2	3	4	5	6			
	DOS	DOS	OS2	OS2	BIOS	BIOS	3.2		
	DATE ENTRY	DATE ENTRY	DATE ENTRY	DATE ENTRY	DATE ENTRY	DATE ENTRY	3.5		
	EXPLICIT	IMPLICIT	EXPLICIT	IMPLICIT	EXPLICIT	IMPLICIT	3.6		
1	1-12/31/1998 P/F	1A-12/31/98 P/F	1-12/31/1998 P/F	1A-12/31/98 P/F	1-12/31/1998 P/F	1A-12/31/98 P/F	P/F		
2	2-09/09/1999 P/F	2A-09/09/99 P/F	2-09/09/1999 P/F	2A-09/09/99 P/F	2-09/09/1999 P/F	2A-09/09/99 P/F	P/F		
3	3-12/31/1999 P/F	3A-12/31/99 P/F	3-12/31/1999 P/F	3A-12/31/99 P/F	3-12/31/1999 P/F	3A-12/31/99 P/F	P/F		
4	4-01/01/2000 P/F	4A-01/01/00 P/F	4-01/01/2000 P/F	4A-01/01/00 P/F	4-01/01/2000 P/F	4A-01/01/00 P/F	P/F		
5	5-02/28/2000 P/F	5A-02/28/00 P/F	5-02/28/2000 P/F	5A-02/28/00 P/F	5-02/28/2000 P/F	5A-02/28/00 P/F	P/F		
6	6-02/29/2000 P/F	6A-02/29/00 P/F	6-02/29/2000 P/F	6A-02/29/00 P/F	6-02/29/2000 P/F	6A-02/29/00 P/F	P/F		
7	7-03/01/2000 P/F	7A-03/01/00 P/F	7-03/01/2000 P/F	7A-03/01/00 P/F	7-03/01/2000 P/F	7A-03/01/00 P/F	P/F		
8	8-12/31/2000 P/F	8A-12/31/00 P/F	8-12/31/2000 P/F	8A-12/31/00 P/F	8-12/31/2000 P/F	8A-12/31/00 P/F	P/F		
9	9-01/01/2001 P/F	9A-01/01/01 P/F	9-01/01/2001 P/F	9A-01/01/01 P/F	9-01/01/2001 P/F	9A-01/01/01 P/F	P/F		
10	10-12/31/2027 P/F	10A-12/31/27 P/F	10-12/31/2027 P/F	10A-12/31/27 P/F	10-12/31/2027 P/F	10A-12/31/27 P/F	P/F		
11	11-09/30/1999 P/F	11A-09/30/99 P/F	11-09/30/1999 P/F	11A-09/30/99 P/F	11-09/30/1999 P/F	11A-09/30/99 P/F	P/F		

✱ - Date Set by + and - off a 4 digit year no 2 digit Implicit date entry

✱✱ - System would not accept 2 digit year input